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examples from gas bearing design**
F. Hendriks
December 1987 APL '88: Proceedings of the international conference on APL
Publisher: ACM

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index terms

The increasing popularity of finite element techniques to solve fluid flow
problems has been due, in large part, to its geometric flexibility and
adaptability. APL shares that property. Therefore, it is a natural companion to
finite element modelling. ...

2 Particle-based fluid simulation for interactive applications
Matthias Müller, David Charypar, Markus Gross
July 2003 SCA '03: Proceedings of the 2003 ACM SIGGRAPH/Eurographics
symposium on Computer animation
Publisher: Eurographics Association

Full text available: 📄 pdf(2.21 MB) Additional Information: full citation, abstract, references, cited
by, index terms

Realistically animated fluids can add substantial realism to interactive
applications such as virtual surgery simulators or computer games. In this
paper we propose an interactive method based on Smoothed Particle
Hydrodynamics (SPH) to simulate fluids ...

3 Transport and anisotropic diffusion in time-dependent flow visualization
D. Bürkle, T. Preußer, M. Rumpf
October 2001 VIS '01: Proceedings of the conference on Visualization '01
Publisher: IEEE Computer Society

Full text available: 📄 pdf(5.85 MB) 🖥 Publisher Site Additional Information: full citation, abstract,
references, cited by,
index terms

The visualization of time-dependent flow is an important and challenging topic in scientific visualization. Its aim is to represent transport phenomena governed by time-dependent vector fields in an intuitively understandable way, using images and animations. ...

Keywords: flow visualization, multiscale image processing, nonlinear diffusion, transport diffusion, upwind method

4 Block-iterative finite element computations for incompressible flow problems
T. E. Tezduyar, R. Glowinski, J. Liou, T. Nguyen, S. Poole
June 1988 I CS '88: Proceedings of the 2nd international conference on Supercomputing
Publisher: ACM

Full text available: 📄 pdf(1.82 MB)   Additional Information: full citation, abstract, references, index terms

A block-iterative finite element procedure is presented for two-dimensional fluid dynamics computations on multiply-connected domains based on the vorticity - stream function formulation of the incompressible Navier-Stokes equations. The difficulty associated ...

5 Solving systems of partial differential equations using object-oriented programming techniques with coupled heat and fluid flow as example
Hans Petter Langtangen, Otto Munthe
March 2001 ACM Transactions on Mathematical Software (TOMS), Volume 27 Issue 1
Publisher: ACM

Full text available: 📄 pdf(1.01 MB)   Additional Information: full citation, abstract, references, index terms

This paper exploits object-oriented implementation techniques to facilitate the development computer codes for solving systems of coupled partial differential equations. We show how to build a simulator for equation systems by merging independent solvers ...

Keywords: C++, coupled heat-fluid, diffpack, finite elements, non-Newtonian fluids, object-oriented programming, software development, systems of partial differential equations

6 APL and finite elements for solving convection-diffusion problems, with examples from gas bearing design
F. Hendriks
December 1987 ACM SIGAPL APL Quote Quad, Volume 18 Issue 2
Publisher: ACM

Full text available: 📄 pdf(871.25 KB)   Additional Information: full citation, abstract, references, index terms

The increasing popularity of finite element techniques to solve fluid flow problems has been due, in large part, to its geometric flexibility and adaptability. APL shares that property. Therefore, it is a natural companion to finite element modelling. ...

7   Physically-based visual simulation on graphics hardware
    Mark J. Harris, Greg Coombe, Thorsten Scheuermann, Anselmo Lastra
    September 2002 HWWS '02: Proceedings of the ACM SIGGRAPH/EUROGRAPHICS
                   conference on Graphics hardware
    Publisher: Eurographics Association
    Full text available: pdf(2.65 MB) Additional Information: full citation, abstract, references, cited
                                                               by, index terms

    In this paper, we present a method for real-time visual simulation of diverse
    dynamic phenomena using programmable graphics hardware. The simulations
    we implement use an extension of cellular automata known as the coupled
    map lattice (CML). CML represents ...

    Keywords: CML, coupled map lattice, graphics hardware, multipass
    rendering, reaction-diffusion, visual simulation

8   Modeling the motion of a hot, turbulent gas
    Nick Foster, Dimitris Metaxas
    August 1997 SIGGRAPH '97: Proceedings of the 24th annual conference on
                  Computer graphics and interactive techniques
    Publisher: ACM Press/Addison-Wesley Publishing Co.
    Full text available: pdf(5.92 MB) Additional Information: full citation, references, cited by

    Keywords: animation, convection, gas simulations, gaseous phenomena,
    physics-based modeling, smoke, steam, turbulent flow

9   Animation and rendering of complex water surfaces
    Douglas Enright, Stephen Marschner, Ronald Fedkiw
    July 2002 SIGGRAPH '02: Proceedings of the 29th annual conference on
               Computer graphics and interactive techniques
    Publisher: ACM
    Full text available: pdf(2.75 MB) Additional Information: full citation, abstract, references, cited
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    We present a new method for the animation and rendering of *photo-realistic*
    water effects. Our method is designed to produce visually plausible three
    dimensional effects, for example the pouring of water into a glass (see figure
    1) and the breaking ...

    Keywords: computational fluid dynamics, implicit surfaces, natural
    phenomena, physically based animation, rendering, volume rendering

10 Animation and rendering of complex water surfaces
    Douglas Enright, Stephen Marschner, Ronald Fedkiw
    July 2002 ACM Transactions on Graphics (TOG), Volume 21 Issue 3
    Publisher: ACM
    Full text available: pdf(2.75 MB) Additional Information: full citation, abstract, references, cited
                                                               by, index terms

    We present a new method for the animation and rendering of *photo-realistic*
    water effects. Our method is designed to produce visually plausible three

dimensional effects, for example the pouring of water into a glass (see figure 1) and the breaking ...

Keywords: computational fluid dynamics, implicit surfaces, natural phenomena, physically based animation, rendering, volume rendering

11 Case study: visualization and analysis of high Rayleigh number --- 3D convection in the Earth's mantle
Gordon Erlebacher, David A. Yuen, Fabien Dubuffet
October 2002 VIS '02: Proceedings of the conference on Visualization '02
Publisher: IEEE Computer Society

Full text available: 📄 pdf(5.48 MB)   Additional Information: full citation, abstract, references, index terms

Data sets from large-scale simulations (up to 501^3 grid points) of mantle convection are analyzed with volume rendering of the temperature field and a new critical point analysis of the velocity field. As the Rayleigh number Ra is increased ...

Keywords: critical points, feature extraction, mantle convection, plumes, unsteady flow, volume rendering

12 Melting and flowing
Mark Carlson, Peter J. Mucha, R. Brooks Van Horn, III, Greg Turk
July 2002 SCA '02: Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation
Publisher: ACM

Full text available: 📄 pdf(4.77 MB)   Additional Information: full citation, abstract, references, cited by

We present a fast and stable system for animating materials that melt, flow, and solidify. Examples of real-world materials that exhibit these phenomena include melting candles, lava flow, the hardening of cement, icicle formation, and limestone deposition. ...

Keywords: animation, computational fluid dynamics, melting, solidifying

13 MCMR: a fluid view on time dependent volume data
Wim de Leeuw, Robert van Liere
May 2003 VISSYM '03: Proceedings of the symposium on Data visualisation 2003
Publisher: Eurographics Association
Full text available: 📄 pdf(2.22 MB) Additional Information: full citation, abstract, index terms

Mass Conservative Motion Reconstruction is a new method for estimating motion in time dependent volume data. A time dependent vector field representing the movement of the data is computed from a sequence of scalar volume data sets. The principle of ...

Keywords: conservation of mass, flow visualization, motion reconstruction, vector fields, volume visualization

14 PM3D: motion estimation in time dependent volume data

Wim de Leeuw, Robert van Liere
October 2002 VI S '02: Proceedings of the conference on Visualization '02
Publisher: IEEE Computer Society

Full text available: pdf(1.81 MB)   Additional Information: full citation, abstract, references, index terms

This paper describes BM3D: a method for the analysis of motion in time dependent volume data. From a sequence of volume data sets a sequence of vector data sets representing the movement of the data is computed. A block matching technique is used for ...

Keywords: biomedical imaging, feature tracking, vector fields, volume visualization

15 Performance modeling and tuning of an unstructured mesh CFD application
William D. Gropp, Dinesh K. Kaushik, David E. Keyes, Barry Smith
November 2000 Supercomputing '00: Proceedings of the 2000 ACM/IEEE conference on Supercomputing (CDROM)
Publisher: IEEE Computer Society

Full text available: pdf(109.40 KB) Publisher Site   Additional Information: full citation, abstract, references, cited by, index terms

This paper describes performance tuning experiences with a three-dimensional unstructured grid Euler flow code from NASA, which we have reimplemented in the PETSc framework and ported to several large-scale machines, including the ASCI Red and Blue ...

16 A multigrid solver for boundary value problems using programmable graphics hardware
Nolan Goodnight, Cliff Woolley, Gregory Lewin, David Luebke, Greg Humphreys
July 2003 HWWS '03: Proceedings of the ACM SIGGRAPH/EUROGRAPHICS conference on Graphics hardware
Publisher: Eurographics Association

Full text available: pdf(2.80 MB)   Additional Information: full citation, abstract, references, cited by, index terms

We present a case study in the application of graphics hardware to general-purpose numeric computing. Specifically, we describe a system, built on programmable graphics hardware, able to solve a variety of partial differential equations with complex ...

17 Designing software for one-dimensional partial differential equations
N. L. Schryer
March 1990 ACM Transactions on Mathematical Software (TOMS), Volume 16 Issue 1
Publisher: ACM

Full text available: pdf(871.03 KB)   Additional Information: full citation, abstract, references, cited by, index terms, review

Users of software for solving partial differential equations are often surprised

by its inability to formulate their problems. Computer scientists speak of partial differential equations (PDEs) as canonical coupled systems, typically in divergence form. ...

18 SPRINT2D: adaptive software for PDEs
M. Berzins, R. Fairlie, S. V. Pennington, J. M. Ware, L. E. Scales
December 1998 ACM Transactions on Mathematical Software (TOMS),
                Volume 24 Issue 4
Publisher: ACM

Full text available: 📄 pdf(207.17 KB) Additional Information: full citation, abstract, references,
                                                                cited by, index terms

SPRINT2D is a set of software tools for solving both steady an unsteady partial differential equations in two-space variables. The software consists of a set of coupled modules for mesh generation, spatial discretization, time integration, nonlinear ...

Keywords: adaptivity, error control, finite-volume methods

19 FOAM: expanding the horizons of climate modeling
Michael Tobis, Chad Schafer, Ian Foster, Robert Jacob, John Anderson
November 1997 Supercomputing '97: Proceedings of the 1997 ACM/IEEE
                conference on Supercomputing (CDROM)
Publisher: ACM
Full text available: 📄 pdf(119.71 KB) Additional Information: full citation, abstract, references

We report here on a project that expands the applicability of dynamic climate modeling to very long time scales. The Fast Ocean_Atmosphere Model (FOAM) is a coupled ocean-atmosphere model that incorporates physics of interest in understanding decade ...

Keywords: climate, distributed memory, hydrology, massively parallel, message passing, meteorology, oceanography, scientific supercomputing

20 Visualization of Steep Breaking Waves and Thin Spray Sheets Around a Ship
Paul Adams, Douglas Dommermuth
October 2003 VIS '03: Proceedings of the 14th IEEE Visualization 2003 (VIS'03)
Publisher: IEEE Computer Society
Full text available: 📄 pdf(264.44 KB) Additional Information: full citation, abstract, references

The simulation of breaking of waves, the formation of thin spray sheets, and the entrainment of air around the next generation of naval surface combatants is an ongoing 3-year Department of Defense (DoD) Challenge Project. The goal of this project is ...

Keywords: isosurfaces, marching cubes, multilevel parallelism

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